

LEGACY OF EXCELLENCE. FUTURE FOCUSED.



Dr. Michele Manuel
Department Chair, Rolf
E. Hummel Professor of
Electronic Materials

The Department of Materials Science and Engineering at the University of Florida is the top-ranked program in the state and is one of the oldest in the country.

The department offers a hands-on approach to engineering steeped in a foundation of theoretical and science education that bridges engineering, chemistry and physics. The goal is to educate well-rounded and successful engineers through design labs where students work on solving real problems facing society.

The department is ABET-accredited and offers bachelor's and graduate degrees in Materials Science and Engineering. The department offers students an opportunity to specialize in a specified material through a certificate option. In addition, the department is looking toward the future of engineering by expanding our nuclear materials, biomaterials, computational materials, and artificial intelligence research areas.

#8

MATERIALS SCIENCE &
ENGINEERING GRADUATE
PROGRAM AMONG PUBLIC
UNIVERSITIES

#2

IN THE COUNTRY FOR MOST FEMALE
FACULTY IN MATERIALS SCIENCE &
ENGINEERING DEPARTMENT

6

NUMBER OF NEW FACULTY
HIRES IN 2019 AND
GROWING

39

NUMBER OF TENURED AND
TENURE-TRACK RESEARCH
FACULTY IN THE DEPARTMENT

Information sourced (from left): U.S. News & World Report;
Departmental Resources; U.S. News & World Reports; ASEE



HIGHLIGHTS



CERTIFICATES

Undergraduate and graduate students can pursue a certificate in biomaterials, ceramics, electronic materials, metals or polymers.



EQUIPMENT

Students are trained on industry-standard equipment such as electron microscopes, 3D printers, and computational materials analysis tools.



DISTANCE LEARNING

Students can participate in the online program, EDGE, to earn a master's degree from afar. The Gator Nation is and can be everywhere.

10

ENDOWED
PROFESSORSHIPS

These professorships are the result of donors who prioritize research and want to help attract and retain top faculty. Thanks to a **\$1 Million gift** in 2018, the department added two new named professorships honoring the legacy of the department founder, Dr. Frederick "Fred" Rhines and two early faculty, Robert DeHoff and Larry Hench.

DEPARTMENT OF MATERIALS SCIENCE & ENGINEERING RESEARCH CENTERS & INSTITUTES

- ▶ Research Service Centers (RSC)
- ▶ Center for Molecular Magnetic Quantum Materials (M2QM)
- ▶ HiPerGator (UF High Performance Computing Center)
- ▶ Center for Particulate and Surfactant Systems (CPaSS)
- ▶ Multi-functional Integrated System Technology (MIST) Center

ENERGY SOLUTIONS. POWERING TOMORROW.



Dr. Andreas Enqvist
Nuclear Engineering
Program Director

The Nuclear Engineering Program is housed within the Herbert Wertheim College of Engineering's Department of Materials Science and Engineering at the University of Florida.

The program offers students an opportunity to work on research teams related to backscatter radiography, extreme environments testing and nuclear fuel

cycles. Students conduct research alongside academics and in partnership with national labs and government agencies.

The department offers ABET-accredited bachelor's degree in Nuclear Engineering and graduate degrees in Nuclear Engineering Sciences.

#12

NUCLEAR ENGINEERING
GRADUATE PROGRAM
AMONG PUBLIC
UNIVERSITIES

\$1M | AWARDED IN FUNDING FROM DOE
AND INMM FOR 2 EARLY CAREER
FACULTY RESEARCH PROJECTS

\$6M | GRANT PROJECT
BEING CONDUCTED
WITH ARPA-E

10 | NUMBER OF TENURED AND TENURE-
TRACK RESEARCH FACULTY
IN THE NE PROGRAM



Information sourced (from left): U.S. News & World Report;
Departmental Resources; ASEE

Partnerships

Argonne National Laboratory; Idaho National Laboratory; Oak Ridge National Laboratory; Pacific Northwest National Laboratory; United States Department of Energy; United States Department of Defense; Nuclear Energy University Program;

Research Areas

- ▶ Nuclear Materials
- ▶ Radiation Detection and Imaging
- ▶ Reactor Physics
- ▶ Nuclear Security, Safeguards and Nonproliferation
- ▶ Fusion and Plasma Physics
- ▶ Thermal Hydraulics

Research Facilities

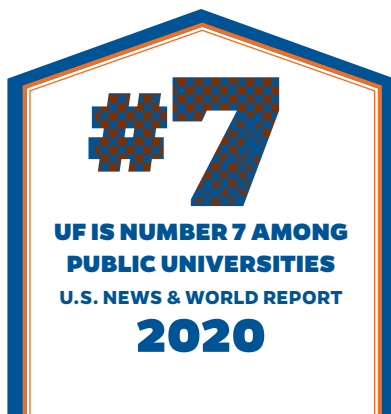
The Nuclear Engineering Program offers hands-on experience through its research labs. Facilities include the reactor, hot cell, hot-scanning electron microscope - focused ion beam tool, hot transmission electron microscopy, microstructural characterization, radiation instrumentation and mechanical testing laboratories. Below are five popular labs for students to gain knowledge and one of our newest labs that will expand our nuclear proliferation research.

- ▶ **University of Florida Training Reactor (UFTR)**
- ▶ **Nuclear Fuels and Materials Characterization (NFMC) Laboratory - a Nuclear Science User Facility (NSUF)**
- ▶ **HiPerGator (UF High Performance Computing Center)**
- ▶ **Laser and Optics Laboratory**

FACULTY

UF IS ON THE RISE

The UF Department of Materials Science & Engineering's graduate program maintained its No. 8 position in the 2021 U.S. News & World Report Best Graduate Schools Ranking, among public institutions. Additionally, the Nuclear Engineering graduate program, housed within the Department, climbed two spots to No. 12 ranking on the list.



UNIVERSITY OF FLORIDA MISSION STATEMENT

The University of Florida is a comprehensive learning institution built on a land-grant foundation. We are The Gator Nation, a diverse community dedicated to excellence in education and research and shaping a better future for Florida, the nation and the world.

Our mission is to enable our students to lead and influence the next generation and beyond for economic, cultural and societal benefit.

DEPARTMENT LEADERSHIP



MICHELE V. MANUEL

Department Chair, Rolf E. Hummel Professor of Electronic Materials, Professor

Computational Thermodynamics and Kinetics; Materials Design; Metallurgy; Biomaterials; Nuclear Materials; Functional Materials



JOHN (JACK) MECHOLSKY JR.

Associate Chair, MSE Graduate and Undergraduate Coordinator, Professor

Fracture of Brittle Materials; Fractal Geometry Applied to Fracture; Failure Analysis; Dental Ceramics; Biomedical Applications



ANDREAS ENQVIST

Nuclear Engineering Program Director, Florida Power and Light Professor, Associate Professor

Nuclear Safeguards; Detection Statistics of Radiation from Fissile Materials; The Physics Behind Particle-detector Interactions; Neutron Physics and Detectors; Neutron Noise Signals; Radiation Signal Analysis



Rhines Hall



CAMMY R. ABERNATHY

**Dean of Engineering,
Professor**

Synthesis of Thin-film Electronic Materials and Devices Using Metal Organic Chemical Vapor Deposition and Molecular Beam Epitaxy



CHRISTOPHER BATICH

Professor

Delivery Methods for Stem Cells; Antimicrobial Surface Modifications; Insect Control and Veterinary Surgery Devices; Polymeric Drug Delivery



KEVIN JONES

**Frederick N. Rhines
Professor of Materials
Science & Engineering,
Distinguished Professor**

Semiconductor Processing and Electron Microscopy Characterization; Ion Implantation of Si, Ge and Compound Semiconductors; Li ion battery development



ASSEL AITKALIYEVA

Assistant Professor

Nuclear Fuels and Materials with Emphasis on Characterization and Property Evaluation; Mechanical and Thermal Properties of Materials; Reactor Irradiation; Radiation Damage in Materials



MEGAN BUTALA

Assistant Professor

Energy Storage Materials; Lithium-ion Batteries; X-ray Diffraction; Pair Distribution Function Analysis; Structure-Property Relationships



HONGGYU KIM

Assistant Professor

Advanced Electron Microscopy Techniques; Quantitative Analysis of Electron Microscopy Data, Digital Image Processing; Understanding Materials Properties at the Atomic Scale; Functional Oxides and Semiconductors



JOSEPHINE ALLEN

**Genzyme Professor of
Materials Science and
Engineering, Associate
Professor**

Stem Cell Engineering; Directed Stem Cell Differentiation; Cell Materials Interactions; Tissue Engineering; Regenerative Medicine



GERHARD E. FUCHS

Associate Professor

Inter-relationship of Processing, Microstructure and Properties of High Temperature/High Performance Materials



AMANDA KRAUSE

Assistant Professor

Interface Design in Ceramic Materials; Phase Nucleation and Growth in Non-Equilibrium Environments; Mass Transport Mechanisms in Grain Boundaries



JENNIFER ANDREW

**Margaret A. Ross
Professor of Materials
Science & Engineering,
Associate Professor**

Nanomaterials; Nanocomposites for Electronic and Biomedical Applications; Magnetic Materials; Multiferroics; Polymers



LAURIE B. GOWER

Professor

Biomimetic Synthesis of Organic-Inorganic Hybrid Composite Materials; Biomaterialization - Processes and Structure; Biomimetic Bone Graft Substitutes; Kidney Stone Formation



CHRIS McDEVITT

Associate Professor

Computational and Theoretical Plasma Physics; Momentum Transport; Runaway Electrons; Monte Carlo Methods



JAMES (JIM) BACIAK

**Florida Power and Light
Professor, Professor**

Applied Aspects of Cargo Monitoring; Detector Testing and Characterization for Gamma-ray Spectroscopy; Development and Analysis of Techniques for Environmental Sampling



KYLE HARTIG

Assistant Professor

Remote Sensing; Nuclear Nonproliferation/Counterproliferation; Nuclear Security; Nuclear Policy



TORI MILLER

Assistant Professor

Structural Evolution in Crystalline Materials; Advanced Electron Microscopy Techniques; Deformation Mechanisms



BAHAR BASIM

Professor of Practice

Chemical Mechanical Polishing; Microelectronics Processing and Integration; Thin Film Characterization; Particle Science



RICHARD HENNIG

**Alumni Professor of
Materials Science &
Engineering, Professor**

Computational Materials Science; Ab-initio Methods; Structure Prediction Algorithms; Two-dimensional Materials; Materials for Energy Technologies; Solid-liquid Interfaces



ERIKA MOORE

**Rhines Rising Star Larry
Hench Professor of Materials
Science & Engineering,
Assistant Professor**

Immunomodulation; Biomaterials, Cell-Material Interactions; Immune Engineering; Tissue Engineering; Regenerative Medicine

**BRIJ M. MOUDGIL**

National Academy of Engineering Member, Distinguished Professor

Engineered Particulate Systems for Enhanced Performance in Nano/Bio Technologies; Micro-electronics; Advanced Materials and Minerals; Photocatalytic Degradation of Hazardous Microbes

**NANCY J. RUZYCKI**

Director of Undergraduate Laboratories, Senior Lecturer

Engineering Education; Characterization Techniques; Surface Physics; Solid State Devices; Dye-sensitized Solar Cells

**DONALD WALL**

UF Training Reactor Director, Professor of Practice

Regulatory Compliance; Nuclear Facility Radiation Safety and Security

**RYAN NEED**

Assistant Professor

Thin Film Deposition; Interface and Defect Engineering; Emergent Phenomenon; Quantum Materials; Nanoionics

**AROBA SALEEM**

Lecturer

Engineering Education; Material Characterization; Non-destructive Evaluation (Electromagnetic Measurements); Structure-Property Relationship; Micromagnetics

**NATHALIE WALL**

Professor

Radiochemistry; Nuclear Wastes; Nuclear Forensics; Nuclear Fuel Cycle; Environmental Behavior of Radionuclides

**JUAN C. NINO**

Alumni Professor of Materials Science & Engineering, Professor

Neuromorphic Hardware for AI; Energy Materials; Multifunctional Ceramics; Single Crystal Growth; Nuclear Materials and Detectors; Bioceramics

**DUWAYNE SCHUBRING**

NE Undergraduate Coordinator, Associate Engineer

Two-phase Flow; Nuclear Reactor Thermal Hydraulics; Quantitative Visualization; Nuclear Reactor Safety; Computational and Numerical Methods

**JUSTIN WATSON**

NE Graduate Coordinator, Associate Professor

Reactor Kinetics and Dynamics; Neutronics; Thermal Hydraulics; Multi-physics Simulation; Advanced Numerical Methods; Applied Mathematics; Advanced Code Coupling Techniques

**DAVID P. NORTON**

Vice President for Research, Professor

Electronic, Photonic and Magnetic Thin Film Materials; Electronic Oxide Materials; Thin Film Deposition

**WOLFGANG SIGMUND**

Professor

Semiconductor Oxides for Energy Harvesting and Storage; Photocatalysis and Photolysis; Electrodes for Secondary Batteries; Barrier Coatings, Nanostructures in Surface Science; Biomedical Applications of Nanoparticles.

**ANTONIO WEBB**

Assistant Professor

Elastomeric Biomaterials; Drug Delivery; Medical Devices; Tissue Engineering/Regenerative Medicine; Entrepreneurship; Translational Research

**STEPHEN J. PEARTON**

Distinguished Professor

Semiconductor Processing; Devices; Thin Film Transistors; Solid State Sensors

**RAJIV K. SINGH**

Professor

Semiconductor Processing; Oxide thin films; III-V Semiconductors; Ultra-hard Materials; Emerging Advanced Materials; Laser Processing

**JIANGENG XUE**

Professor

Nanostructured Electronic Materials; Organic-inorganic Hybrid Materials; Surfaces and Interfaces; Energy Materials; Photovoltaic Cells; Light-emitting Diodes and other Optoelectronic Devices

**SIMON R. PHILLPOT**

Vladimir A. Grodsky Professor of Materials Science, Distinguished Professor

Computational Materials Science; Heat Transport; Nuclear Materials; Ferroelectrics and Dielectrics; Mechanical Properties of Metals; Simulation Methodology

**MICHAEL TONKS**

Associate Professor

Computational Materials Science; Computational Mechanics; Coevolution of Microstructure and Properties; Materials in Harsh Environments; Mesoscale Modeling and Simulation; Nuclear Materials; Numerical Methods

**YONG YANG**

Associate Professor

Structural and Fuel Materials for Nuclear Energy Systems; LWRs Sustainability and Aging Management; Advanced Fabrication and Joining Technologies; Used Fuel Dry Storage and Disposition



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College of Engineering
*Department of Materials Science
& Engineering*
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